



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/471,981	12/23/1999	EMIKO IGAKI	MTS-3181US	8182

7590 03/14/2002

ALLAN RATNER
RATNER & PRESTIA
SUITE 301 ONEW WESTLAKES BERWYN
P O BOX 980
VALLEY FORGE, PA 194820980

EXAMINER

TRAN, LY T

ART UNIT	PAPER NUMBER
----------	--------------

2853

DATE MAILED: 03/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/471,981

Applicant(s)

IGAKI ET AL.

Examiner

Ly T TRAN

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-82 is/are pending in the application.
- 4a) Of the above claim(s) 2 and 6-38 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 4, 5, 40, 41, 43, 51, 53, 54 and 56 is/are allowed.
- 6) ☒ Claim(s) 3, 39, 42, 44-50, 58, 61-64, 71, 76, 81 and 82 is/are rejected.
- 7) ☒ Claim(s) 52, 55, 57, 59, 60, 65-70, 72-75 and 77-80 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1) Claims 3, 44, 58, 61-64, 71, and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Michaelis et al. (EP 0 777 703) in view of Tsukada et al. (USPN 6,097,412).

Michaelis et al. discloses (Figs. 9(a)-10(b); column 14, line 56, through column 15, line 34) an ink-jet recording head comprising at least one piezoelectric block (B) (see Fig. 10(b)). Each piezoelectric block (B) has first and second ink pressure chambers 613 (not labeled in Fig. 10(b)), each pressure chamber communicating with a nozzle (Fig. 9(b), element 618), first and second partition walls 603, each partition wall serving as a driving portion for one of the ink pressure chambers, each partition wall including a piezoelectric element (605, 607) and two electrodes (619, 621) for driving said piezoelectric element, a pressure buffer chamber 615, and first and second fixed walls 630. The first fixed wall, the first ink pressure chamber, the first partition wall, the pressure buffer chamber, the second partition wall, the second ink pressure chamber, and the second fixed wall are arranged in sequence along a thickness direction.

With respect to claim 44, shown in Fig. 10(b) are a plurality of these blocks, arranged in the thickness direction.

With respect to claim 58, the pressure buffer chambers are all closed on a side at which the nozzle communicating with the ink pressure chamber is open (see Fig. 9(b)).

With respect to claims 61-64, there are exactly two electrodes per partition wall, one of which is exposed to the pressure buffer and the other exposed to the ink pressure chamber. With respect to claim 71, a portion at which the electrodes on a partition wall face each other is included in a portion at which the ink pressure chamber and pressure buffer chamber face each other (Figs. 9(b) and 10(b)). With respect to claim 76, the distance between nozzles appears to be constant (Fig. 10(b)).

However, Michaelis et al. fails to teach the piezoelectric block is an integrally sintered one piece block structure.

Tsukada et al. teaches the piezoelectric block is an integrally sintered one piece block structure (Column 3: line 6-7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Michaelis et al. with the piezoelectric block is an integrally sintered one piece block structure as taught by Tsukada et al. The motivation of doing so is in order to reduce production cost of the piezoelectric device (Tsukada USPN 6,097,412; Column 3: line 9-12).

2. Claims 39, 42, and 46-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Michaelis et al. (EP 0 277 703 A1) in view of Tsukada et al (USPN 6,097,412)

Michaelis et al. discloses an invention of the type claimed, except for its method of manufacture.

Regardless of the method of production, the product is disclosed by Michaelis et al.. The limitations added by claims 39, 42, and 46-50 are limitations on how the

recording head is produced. Thus, these claims are product-by-process claims (See MPEP §2113).

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

3. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Michaelis et al. (EP 0 277 703 A1) in view of Tsukada et al (USPN 6,097,412) as applied to claim 3 above, further in view of Kishi (US 6095641 A).

The combination of Michaelis et al. and Tsukasa et al discloses an invention of the type claimed. However, Michaelis et al. and Tsukasa et al fail to teach that piezoelectric blocks (B) are not repeatedly arranged in a direction perpendicular to the thickness direction.

Kishi teaches (Fig. 1; column 2, lines 1-4) that one would stack piezoelectric blocks in a direction perpendicular to the thickness direction. Kishi suggests that this method is commonly used to allow for color printing.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Michaelis et al. and Tsukada et al to incorporate the teaching of Kishi. One would have been motivated to make such a modification by the suggestion of Kishi that it is commonly used to allow for color printing.

4. Claim 81 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraishi et al. (USPN 5,471,231) in view of Michaelis et al. (EP 0 777 703).

With respect to claim 80, Hiraishi et al. discloses that surface of the electrodes are oriented perpendicular to the thickness direction, the driving portion is polarized in the thickness direction and perpendicular to the surfaces of the electrodes (Fig. 7: element 7, 74bc, Column 9: line 4563).

However, Hiraishi et al. fail to teach piezoelectric block (B), piezoelectric block (B) has first and second ink pressure chambers, each pressure chamber communicating with a nozzle, first and second partition walls, each partition wall serving as a driving portion for one of the ink pressure chambers, each partition wall including a piezoelectric element and two electrodes for driving said piezoelectric element, a pressure buffer chamber and first and second fixed walls. The first fixed wall, the first ink pressure chamber, the first partition wall, the pressure buffer chamber, the second partition wall, the second ink pressure chamber, and the second fixed wall are arranged in sequence along a thickness direction

Michaelis et al. teaches piezoelectric block (B) (see Fig. 10(b)). Each piezoelectric block (B) has first and second ink pressure chambers 613 (not labeled in Fig. 10(b)), each pressure chamber communicating with a nozzle (Fig. 9(b), element 618), first and second partition walls 603, each partition wall serving as a driving portion for one of the ink pressure chambers, each partition wall including a piezoelectric element (605, 607) and two electrodes (619, 621) for driving said piezoelectric element, a pressure buffer chamber 615, and first and second fixed walls 630. The first fixed wall, the first ink pressure chamber, the first partition wall, the pressure buffer chamber, the second partition wall, the second ink pressure chamber, and the second fixed wall are arranged in sequence along a thickness direction.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Hiraishi et al a pressure buffer chamber as taught by Michaelis et al. The motivation of doing so is in order to prevent cross talk between electrodes.

5. Claim 82 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraishi et al. (USPN 5,471,231) in view of Michaelis et al. (EP 0 777 703) as applied to claim 80 above, further in view of Tsukada et al. (USPN 6,097,412).

The combination of Hiraishi et al and Michaelis et al. fails to teach the piezoelectric block is an integrally sintered one piece block structure.

Tsukada et al. teaches the piezoelectric block is an integrally sintered one piece block structure (Column 3: line 6-7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Michaelis et al. with the piezoelectric block is an integrally sintered one piece block structure as taught by Tsukada et al. The motivation of doing so is in order to reduce production cost of the piezoelectric device (Tsukada USPN 6,097,412; Column 3: line 9-12).

Allowable Subject Matter

6. Claims 1, 4, 5, 40, 41, 43, 51, 53, 54 and 56 are allowed.

The primary reason for the allowance of claims 1, 4, 5, 40, 41, 43, 51, 53, 54 and 56 is the inclusion of the limitation in claims 1 and 4 of one of the fixed walls to be disposed adjacent to the ink pressure chamber and another of the fixed walls to be disposed adjacent to the pressure buffer chamber. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or

suggested by the prior art of record which makes these claims allowable over the prior art.

7. Claims 52, 55, 57, 60, 59, 65-70, and 72-75, 77-80 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 52 is allowable over the prior art of record because at least prior art has not been found to anticipate a length of the fixed walls in the thickness direction is greater than that of the partition walls in the thickness direction.

Claim 55 is allowable over the prior art of record because at least prior art has not been found to anticipate each of the fixed walls includes a portion firmer than the partition wall.

Claim 57 is allowable over the prior art of record because at least prior art has not been found to anticipate each of fixed walls includes a hollow portion.

Claim 60 is over the prior art of record because at least prior art has not been found to anticipate each of electrodes has a mesh-like structure.

Claim 59 is allowable over the prior art of record because at least prior art has not been found to anticipate the pressure buffer chamber to communicate with an air inlet/outlet path connected outside of the recording head.

Claims 65-67 are allowable over the prior art of record because at least prior art has not been found to anticipate both electrodes to be embedded inside the partition wall.

Claim 68 is allowable over the prior art of record because at least prior art has not been found to anticipate at least one electrode to be further disposed between the two electrodes.

Claims 69 and 70 are allowable over the prior art of record because at least prior art has not been found to anticipate the electrode at the surface exposed to the ink pressure chamber.

Claim 72 is allowable over the prior art of record because at least prior art has not been found to anticipate a length of one of the electrodes in a direction perpendicular to the thickness direction to be different from a length of the other electrode adjacent to said one electrode in the same direction.

Claim 75 is allowable over the prior art of record because at least prior art has not been found to anticipate a length of the ink pressure chamber in a direction perpendicular to the thickness direction to be different from a length of the pressure buffer chamber in the same direction.

Claims 77-80 are allowable over the prior art of record because at least prior art has not been found to anticipate nozzles are aligned without any overlapping in the direction perpendicular to the moving direction, and $X=P/m$

Wherein X presents a deviation between the nozzles nearest each other out of the nozzles in reference to the moving direction, m presents an integer number of nozzles, and P presents a distance between the nozzles belonging to the same nozzles alignment.

Conclusion

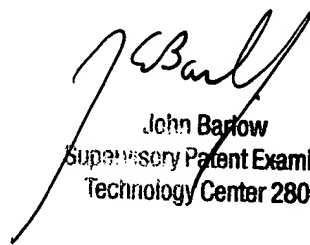
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ly T TRAN whose telephone number is 703-308-0752. The examiner can normally be reached on M-F (7:30am-5pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on 703-308-3126. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0967.

lt

February 26, 2002


John Barlow
Supervisory Patent Examiner
Technology Center 2800